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Reference 2

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Applicant: TOYOTA MOTOR CORPORATION, Aichi (JP)

Title: EXHAUST EMISSION CONTROL DEVICE OF INTERNAL COMBUSTION  
ENGINE

[Detailed Description of the Invention]

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[0003]

As technologies of removing suspended particulate matters accumulated in filters to regenerate the filters, a technology of supporting a precious metal catalyst on the whole area of a filter to burn suspended particulate matters at low temperature by oxidation reaction induced by the precious metal catalyst and a technology of supplying unburnt fuel to a filter by performing post-injection to burn suspended particulate matters by the oxidation reaction of the fuel are known.

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[0030]

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FIG.4 is a perspective view illustrating the appearance shape of the filter 30. To facilitate understanding, the enlarged inner structure is illustrated by the cross section of one part.

The filter (particulate filter) 30 is composed of: a cylindrical case 302 with a flange; and an element 304 inserted into the case 302 and having an outer periphery welded to the case. The element 304 has a roll structure in which a nonwoven fabric 306 made of a refractory metal and a corrugated plate 308 made of a refractory metal are layered and cylindrically rolled around a center rod 310 as a core. The element 304 used in the particulate filter 300(30?) of the present embodiment has an outer diameter of about 55 mm and a length of about 40 mm. As a matter of course, these sizes may be changed conveniently in accordance with a diesel engine displacement and the inner diameters of an exhaust pipe.

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[0047]

In the third embodiment, the clogging of the filter 30 is reduced in an exhaust gas introducing part by supporting a catalyst CT on a nonwoven fabric 306 of a filter 30a closer to the exhaust gas introducing part of the filter 30. More specifically, suspended particulate matters trapped in the nonwoven fabric 306 are oxidized and eliminated by active oxygen generated by the contact of O<sub>2</sub> included in the exhaust gas with the catalyst CT. The structure of the filter 30 shown in FIG. 10 only conceptually exhibits the state of supporting the catalyst CT on the region of the exhaust gas introducing part of the filter 30 for explanation and exemplifies the catalyst

CT supported on the nonwoven fabric 306. As a practical matter, the catalyst CT is supported on fibers composing the nonwoven fabric 306 or on the corrugated plate 308.

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[0049]

According to the filter 30 applied to the third embodiment, the catalyst is supported on the nonwoven fabric 306 of the filter 30a closer to the exhaust gas introducing part, and therefore suspended particulate matters trapped in the filter 30a closest to the exhaust gas introducing part is oxidized sequentially. Accordingly, suspended particulate matters can be inhibited or prevented from being accumulated in the exhaust gas introducing part. Consequently, suspended particulate matters are trapped over the whole trapping region of the filter 30 without clogging the exhaust gas introducing part of the filter 30 with accumulated suspended particulate matters, so that the trapping performance of the filter 30 can be utilized effectively.

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